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National Renewable Energy Laboratory

Innovation for Our Energy Future

Data Gaps in the Modeling of Renewable Energy Markets

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SCOPE

- Not Comprehensive: Presentation is restricted to my personal experience in modeling RE markets.

- Model-oriented: This is not a conceptual list. At one point or another I've actually needed these data for a modeling project.

What is a Data Gap?

- Data that is needed but is not:
  - Publicly available
  - Available or easily compiled at the appropriate spatial resolution
  - Applicable to future years
  - Consistent across the entire data set
  - Consistent with other data sources used
  - From sources that can be referenced
  - Too costly

Data Categories

- Fuel prices
- Technology characterization
- Electricity transmission
- Electric sector utility data
- Consumer choice
- Buildings data
- Transportation
- Uncertainties

Fuel Prices

- Projections below the NERC/EMM and Census region level (WinDS)
- Projections beyond 2030 (WinDS, SEDS)
- Coal price projections by coal characteristics and by type of sale (e.g. contract vs spot) (WinDS)
- Nuclear fuel supply curves (WinDS-GCC)

Technology Characterization

- No consistent set of RE technology characterizations since the 1997 DOE/EPRI TCs (WinDS, SEDS)
- Lack of an authoritative source of general energy TCs (WinDS, SEDS)
  - AEO data questionable due to recent price increases that are not reflected in AEO
- Lack of a consistent set of learning data (all)
  - Separation of R&D and learning
  - International impacts
- Lack of comprehensive consistent data on R&D expenditures vs technology improvement (all)
- No data on price vs “profited cost” as a function of demand growth (all)

Electric Utility Data

- Consistent national data on rate bases – current and future - for price formation (WinDS-PHEV, SEDS)
- Consistent regional data on rate structures (SolarDS)
- Ancillary service values (WinDS-PHEV)
  - Regulation reserve –up and down
- Typical operating data for plants providing ancillary services (WinDS)

Electric Transmission

- Comprehensive transmission line data (WinDS)
  - Including below 138 KV
  - With conductor ratings
  - With usage data – actual and contract
  - Costs of construction, siting, ROWs
  - Corridor expansion potential

Consumer Choice Data

- Planning hurdle rates (all)
  - by sector/industry
  - By regulated utilites vs IPPs
- Logit parameters by market (SEDS, SolarDS)
  - Attributes
  - Utility function parameters

Buildings (SolarDS)

- Solar access data
- Roof availability data
- Load data for different building types/regions
  - Type of load
  - Timing of loads
- Access to different rate structures

Transportation

- Driving/parking patterns (PHEV)
- Gasoline consumption by county (WinDS-PHEV)
- Fueling station data (HyDive)
  - Revenues, margins, operating costs
  - Sales in gallons by stations/counties
  - Station construction costs
- Automotive OEM data (HyDive)
  - New vehicle development costs
    - Body vs platform
    - Profit margins by vehicle type

Uncertainties (SEDS)

- Fuel prices/availability
  - Oil prices
  - LNG availability
- Technology characterizations
  - Correlations between time periods
  - Correlations between cost and performance
- Policies
  - Carbon caps/taxes
  - Federal RPS, PTC, etc

Discussion?